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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,337	03/26/2004	Raymond A. Birgenheier	10030198-1	1582

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EXAMINER	
CHOW, CHARLES CHIANG	

ART UNIT	PAPER NUMBER
2618	

DATE MAILED: 12/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/811,337	BIRGENHEIER ET AL.
	Examiner	**Art Unit**
	Charles Chow	2618

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *30-40* is/are allowed.

6)☒ Claim(s) *1-5,8-10,12 and 26-28* is/are rejected.

7)☒ Claim(s) *6,7,11,13-25 and 29* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *3/26/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-2, 4-5,8-9, 12, 26, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golan [US 5,826,180] in view of Miyauchi [US 2004/0041,554 A1].

For claim 1, Golan teaches a method of characterizing an intermediate frequency (IF) response of a receiver [the method for calibrating, correcting, image rejection at IF, outputs of the mixers 29-30, having x(t), of a receiver in Fig. 3, abstract, col. 2, lines 22-58],

comprising determining an estimate of an actual IF response of the receiver from IF responses of the receiver under test measured for frequency band [tuning frequency of oscillator for rf input of 20-1200 MHz, col. 3, lines 15-23; & estimating actual IF response z(t)=I(t) +Q(t), equations 8, 17-18, in col. 4, & col. 5]; and

a set of conversion coefficients computed from the IF responses [the calculated amplitude mismatching ε & phase mismatch α, for IF response, I(t), Q(t), col. 4, lines 41-67] such that the estimate reduces an effect of an uncertainty in knowledge of a radio frequency (RF) stimulus signal used in the IF response measurements [the estimated I(t), Q(t) reducing the effect of uncertainty of the image signal of the rf stimulus, by removing the image signal, col. 3, line 60 to col. 4, line 4].

Golan teaches the tuning of DDS 34 for generating harmonic at image frequency f2, col. 4, lines 5-16], but fails to mention of the overlapping frequency bands.

Miyauchi teaches the IF responses of the receiver under test measured for overlapping frequency bands [the first, second, measured data, D11, D21, at IF assembly 50, paragraph 0065, Fig. 8-9, of the spectrum analyzer in side casing 300 in Fig. 7, for the <u>overlapping frequency band, 4.7-5.3 GHz</u>, in Fig. 11, of the frequency band F1+Fi2 to F2+Fi2 (4,3-6.3 GHz) and frequency band F1-Fi2 to F2-Fi2 (3,7-5.7 GHz), paragraph 0076], in order to further removing the influence of image data in the IF response [paragraph 0029-0031]. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Golan with Miyauchi's measuring data of the two frequency bands with overlapping frequency band, in order to further removing the influence of image data in the IF response.

For claim 2, Golan teaches a method [col. 2, lines 22-58], computing the set of conversion coefficients from the measured IF responses [the calculated correction parameter, amplitude mismatching ε & phase mismatch α, for IF response, I(t), Q(t), col. 4, lines 41-67], but fails to teach the measuring of the IF response of a receiver for plurality of overlapping frequency bands.

Miyauchi teaches the IF responses of the receiver under test measured for overlapping frequency bands [the first, second, measured data, D11, D21, at IF assembly 50, paragraph 0065, Fig. 8-9, of the spectrum analyzer in side casing 300 in Fig. 7, for the <u>overlapping frequency band, 4.7-5.3 GHz</u>, in Fig. 11, of the frequency band F1+Fi2 to F2+Fi2 (4,3-6.3) and frequency band F1-Fi2 to F2-Fi2 (3,7-5.7 GHz), paragraph 0076], using the same reasoning in claim 1 above to combine Miyauchi to Golan.

For claim 4, Golan teaches the method [col. 2, lines 22-58], & the wherein the uncertainty in knowledge being a result of one of an uncertainty in knowledge of a baseband transmitter filter frequency response [the uncertainty of the transmitted baseband filter

response for the modulated rf signal to mixers 29-30 in Fig. 3] and an uncertainty in knowledge of a spectrum of a baseband stimulus signal [the spectrum of the baseband for image signal at f2, col. 1, lines 34-43].

For claims 5, 28, Golan teaches the method [col. 2, lines 22-58], & the further comprising removing an effect of a radio frequency (RF) tilt in a magnitude response of an RF portion of the receiver [the removing of an amplitude effect by correcting the amplitude mismatching using ε, col. 4, lines 41-67].

For claim 8, Golan teaches the method [col. 2, lines 22-58], but fails to teaches the measuring the IF response for the overlapping frequency bands.

Miyauchi teaches the wherein the IF responses are measured for overlapping frequency bands comprising: applying a radio frequency (RF) stimulus signal to an input of the receiver; and measuring an IF output signal response at an output of the receiver for each of a plurality of the overlapping frequency bands [the first, second, measured data, D11, D21, at IF assembly 50, paragraph 0065, Fig. 8-9, of the spectrum analyzer in side casing 300 in Fig. 7, for the <u>overlapping frequency band, 4.7-5.3 GHz</u>, in Fig. 11, of the rf stimulus frequency band F1+Fi2 to F2+Fi2 (4,3-6.3) and the rf stimulus frequency band F1-Fi2 to F2-Fi2 (3,7-5.7 GHz), paragraph 0076], using the same reasoning in claim 1 above to combine Miyauchi to Golan.

For claim 9, Golan teaches the method [col. 2, lines 22-58], & the wherein measuring an IF output signal response further comprises computing a transfer characteristic for the IF output signal response measurement [the computing of the transfer characteristic for the IF response using equations 8-10, equations 17-18].

For claim 12, Golan teaches the method [col. 2, lines 22-58], & the wherein a conversion coefficient of the set defines a relationship between the actual IF frequency

response [the conversion coefficients ε & α, for IF response, I(t), Q(t), col. 4, lines 41-67], but fails to teach the IF frequency responses measured for overlapping frequency bands.

Myiyauchi teaches the IF frequency responses measured for overlapping frequency bands [the first, second, measured data, D11, D21, at IF assembly 50, paragraph 0065, Fig. 8-9, of the spectrum analyzer in side casing 300 in Fig. 7, for the overlapping frequency band, 4.7-5.3 GHz, in Fig. 11, of the rf stimulus frequency band F1+Fi2 to F2+Fi2 (4,3-6.3) and the rf stimulus frequency band F1-Fi2 to F2-Fi2 (3,7-5.7 GHz), paragraph 0076], using the same reasoning in claim 1 above to combine Miyauchi to Golan.

For claim 26, Golan teaches a method of characterizing an intermediate frequency IF response of a receiver to reduce an effect of stimulus signal uncertainty [the method for calibrating, correcting, image rejection at IF, outputs of the mixers 29-30, having x(t), of a receiver in Fig. 3, abstract, col. 2, lines 22-58, to reduce the effect of the uncertainty of the image signal in the stimulus signal],

the method comprising computing a set of conversion coefficients from the IF response measurements [computing conversion coefficients ε & α from equation 14-15, col. 5 & col. 5, lines 23-35]; and

determining an estimate of an actual IF frequency response using the IF response measurements and the conversion coefficients [using parameters ε & α, for the corrected IF response I(t), Q(t), equations 8-10, equations 17-18, col. 5, lines 31-35], the estimate reducing the effect of stimulus signal uncertainty used in measuring [to remove the image response, col. 5, lines 31-35, from the uncertainty of the image signal in the input stimulus].

Golan fails to teaches the measuring an IF response of a receiver at a plurality of overlapping frequency bands.

Miyauchi teaches the measuring an IF response of a receiver at a plurality of overlapping frequency bands [the first, second, measured data, D11, D21, at IF assembly 50, paragraph 0065, Fig. 8-9, of the spectrum analyzer in side casing 300 in Fig. 7, for the overlapping frequency band, 4.7-5.3 GHz, in Fig. 11, of the frequency band F1+Fi2 to F2+Fi2 (4,3-6.3 GHz) and frequency band F1-Fi2 to F2-Fi2 (3,7-5.7 GHz), paragraph 0076], in order to further removing the influence of image data in the IF response [paragraph 0029-0031]. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Golan with Miyauchi's measuring data of the two frequency bands with overlapping frequency band, in order to further removing the influence of image data in the IF response.

2. Claims 3, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golan in view of Miyauchi, as applied to claims 1, 16 above, and further in view of Dufour et al. [US 2003/0187,601 A1].

For claims 3, 27, Golan & Miyauchi fail to teach the wherein measuring comprises averaging measurements of the IF frequency response at the overlapping frequency bands of the plurality.

Dufour et al. [Dufour] teaches the measuring comprises averaging measurements of the IF frequency response at the overlapping frequency bands of the plurality [the averaging of the gain & phase difference obtained in step c4, paragraph 0019, of the group of frequencies, paragraph 0018, 0102; of the overlapping frequency bands of 80, 81 & 82, 83, paragraph 0095; for predicting new gain value in paragraph 0103-0104; computer readable instructions for calibration in paragraph 0107], for reducing the amount of frequency tuning for the wideband calibration & measurement [0007]. Therefore, It would have been obvious

to one of ordinary skill in the art at the time the invention was made to improve Golan & Miyauchi with Dfour's calibration, in order to reduce the amount of frequency tuning for the wideband calibration.

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golan in view of Miyauchi, as applied to claim 1 above, and further in view of Fullerton et al. [US 2004/0136,438 A1].

For claim 10, Golan teaches the method [col. 2, lines 22-58], Golan & Miyauchi fail to teach the wherein the RF stimulus signal is a broadband signal comprising one or both of a summation of a plurality of sinewaves and a periodic chirped waveform.

Fullerton et al. [Fullerton] teaches the rf signal generator for generating the RF stimulus signal is a broadband signal comprising one or both of a summation of a plurality of sinewaves and a periodic chirped waveform [the generating of rf stimulus signal having any suitable combination of carrier frequency shape, duration, of the sine wave signal, chirped signal or any other form of signal that has desired spectral characteristics, for generating signal to achieve desired spectral characteristics, in paragraph 0153]. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to improve Golan, Miyauchi with Fullerton's rf signal with any combination of sine wave, chirped signals, in order to generating rf signal to achieve desired spectral characteristics.

Claims Objection

4. Claims 6-7, 11, 13-25, 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior arts fail to teach the features in claim 6, for the second setting corresponding to an image IF response of the receiver to the first setting; determining the estimate of the actual IF frequency response at the second setting to obtain an image estimate (X)image(k); and combining the non-image estimate (X)(k) and the image estimate (X)image(k) response to cancel the effect of the RF tilt;

the square-root of product of non-image estimate (X)(k) and the image estimate (X)image(k) [in claim 7]; a period is reciprocal of Δf, step size or tuning resolution [in claim 11]; the equation Yi(k) = ai * X(k) + Ni(k) [in claim 13];

the minimizing a sum-square different between the measured IF response for a plurality of overlapping frequency bands [in claims 14, 29]; the half band measurements corresponding to IF frequency response measurements in upper, lower, bands of the overlapped frequency band portions [in claim 15];

the defined parameters in the equations for Zi(k)s, Yi(k), k, ai, ai+1, bi, Z2i-1, weighted average of the IF response measurement for the overlapping frequency bands [in claims 16-22];

the reducing an effect of a delay misalignment associated with the random-added delay in the IF responses measured at the overlapping frequency bands; the removing a delay before computing the set of the conversion coefficients; the removing a delay misalignment comprising the finding a phase progression in a ration of the measured IF response from overlapping bands multi0lying the ratio by a complex conjugate of the phase progression to remove the phase progression [in clam 23-25].

Allowable Subject Matter

5. The following is an examiner's statement of reasons for allowance:

Claims 30-40 are allowable over the prior art of record. The prior arts fail to teach the allowable features, singly, particularly, or in combination.

Claims 30, 33 are allowable over the prior art of record, the prior art fails to teach singly, particularly, or in combination, the allowable features <u>for characterizing an IF response</u> having the **structure** for a **controller that controls**<u> the signal generator, the receiver under test, & the IF processor</u>, the controller processing the <u>digitized IF response</u> and a computer program when executed, implement <u>determining an estimated of an actual IF response</u> of the receiver under test at **overlapping frequency bands associated with a set of computed conversion coefficients** to reduce an effect of uncertainties in RF stimulus signal.

The dependent claims 31-32, 34-40 are also allowable due to their dependency upon the allowable independent claims above, and the having additional claimed features.

The closest prior art **Golan [US 5,826,180]** teaches the calibrated image rejection having computed coefficients ε, α, for amplitude, phase correction [abstract, Fig. 3, col. 1, line 62 to col. 2, line 21; col. 3, lines 15-23 & method steps in col. 2, lines 29-58], but fails to teach the **structure for a controller to control** the signal generator, the receiver under test, <u>& the IF processor</u>, the controller processing the <u>digitized IF response</u> and a computer program when executed, implement <u>determining an estimated of an actual IF response</u> of the receiver under test at **overlapping frequency bands associated with a set of computed conversion coefficients.**

Miyauchi [US 2004/0041,554 A1] teaches removing of image signal by frequency sweeping of two band, Fi+F2 to F2+Fi2, 4.3 to 6.3 GHz & F1-Fi2 to F2-Fi2, 3.7 to 5,7 GHz & obtaining measuring data D1j, D2j [Fig. 11, abstract, paragraph 0065, 0076-0077, Fig. 7-10], but fails to teach the **structure for a controller to control** the signal generator, the receiver

under test, & the IF processor, the controller processing the digitized IF response and a computer program when executed, implement determining an estimated of an actual IF response of the receiver under test at **overlapping frequency bands associated with a set of computed conversion coefficients.**

Dufour et al. [US 2003/0187,601 A1] also teaches the overlapping frequency band calibration of a wideband direction finding system [Fig. 6, Fig. 4, paragraph 0095, 0098, 0088], to correct the gain & phase variations [abstract, paragraph 0102-0105], but fails to teach the above allowable feataures.

Other prior arts in below has been considered, but they fail to teach the above allowable features.

Fullerton et al. [US 2004/0136,438 A1]; Nara [US 2005/0118,970 A1, Nov. 12, 2004, late on filing date, teaches overlapping frequency band Fb for the coefficients of the two frequency band calibrations, abstract **]; Finman [US 5,117,377,** abstract Fig. 1a**]; Narita et al. [US 2004/0248,526 A1,** teaches signal generator with filters]; **Kim [US 5,978,659,** teaches calibration of telephone call conversation]; **Paulus [US 2005/0070,236 A1,** teaches calibration tone 75 for removing image, paragraph 0042-0052, 0034-0035, 0063, 0146]; **Dalebroux et al. [US 6,636,722 B1]; Miyagi [US 6,920,321 B1], Tarantino et al. [US 5,099,200]; Marino et al. [US 6,526,365 B1]; Cutler [US 6,842,608 B2, assignee]; Cain et al. [US 2003/0050,014 A1]; Huang et al [US 6,337,888 B1]; Ciccarelli et al. [US 6,785,529 B2, Fig. 9]; Heaton et al. [US 2005/0186,914 A1]; Green et al. [US 7,088,765 B1].**

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the

issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Chow whose telephone number is (571) 272-7889. The examiner can normally be reached on 8:00am-5:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charles Chow C.C.

December 2, 2006.

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